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(72) Inventor: **HIGUCHI, Masahiro**

**Fujimino-shi, Saitama 356-8511 (JP)**

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(74) Representative: **Blodig, Wolfgang**

**Wächtershäuser & Hartz**

**Patentanwaltpartnerschaft**

**Ottostrasse 4**

**80333 München (DE)**

(71) Applicant: **Nisshin Foods Inc.**

**Tokyo 101-8441 (JP)**

(54) **DRIED PASTA MANUFACTURING METHOD**

(57) Provided is dried pasta having no or very little cracking and a manufacturing method therefor. The method for manufacturing dried pasta comprises a drying step of drying pasta noodle strands to reach the percentage of water content of 14% or less under an environment maintained at a temperature of 75 to 95°C and humidity of 60 to 90%; a heating step of heating, after the drying step, the pasta noodle strands for 10 to 120 minutes un-

der an environment maintained at a temperature lower by at least 15°C than the temperature in the drying step and within a range of 50 to 80°C, and humidity of 60 to 90%; and a cooling step of cooling, after the heating step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%.

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## Description

[Technical Field]

5 **[0001]** The present invention relates to a method for manufacturing dried pasta having no cracking.

[Background Art]

10 **[0002]** Dried pastas which have cracking or deformation are not visually beautiful, and the commercial value is drastically impaired. Particularly in the case of long pasta such as spaghetti, cracking is likely to cause damage such as breakage and chipping of pasta. Therefore, prevention of cracking is important.

**[0003]** Cracking is primarily attributable to uneven drying in a drying step. In view of this, conventionally, a method for preventing cracking or stabilizing a shape of dried pasta by eliminating uneven drying of pasta has been proposed.

15 **[0004]** For example, Patent Literature 1 describes a method for stabilizing the shape of pasta, comprising increasing the percentage of water content of pasta by 0.1 to 2% by adding water to the surface of the pasta before final drying in the step of drying the pasta, and immediately thereafter, decreasing temperature of the pasta. Patent Literature 2 describes a method for improving the quality of dried pastas, comprising maintaining dried pastas in an atmosphere at 50 to 95°C. Patent Literature 3 describes a method for drying pasta, comprising the steps of processing fresh pasta with saturated vapor at 75 to 80°C and drying the fresh pasta at a temperature of 50 to 60°C until the percentage of water content of 11 to 12% is reached.

20 **[0005]** However, in the case of the method of Patent Literature 1, controlling the water content of pasta by addition of water is difficult. Also, the actual situation is that fully satisfactory results have not been achieved with other methods as well in respect of prevention of cracking.

25 [Citation List]

[Patent Literature]

**[0006]**

30

[Patent Literature 1] JP-B-07-059179

[Patent Literature 2] JP-A-2001-149030

[Patent Literature 3] JP-A-06-090693

35 [Summary of Invention]

**[0007]** The present invention provides a method for manufacturing dried pasta, comprising a drying step of drying pasta noodle strands to reach the percentage of water content of 14% or less under an environment maintained at a temperature of 75 to 95°C and humidity of 60 to 90%; a heating step of heating, after the drying step, the pasta noodle strands for 10 to 120 minutes under an environment maintained at a temperature lower by at least 15°C than the temperature in the drying step and within a range of 50 to 80°C, and humidity of 60 to 90%; and a cooling step of cooling, after the heating step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%.

40 **[0008]** The present invention also provides a method for manufacturing dried pasta, comprising a drying step of drying pasta noodle strands to reach the percentage of water content of 14% or less under an environment maintained at a temperature of 75 to 95°C and humidity of 60 to 90%; a cooling step of cooling, after the drying step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%; and a heating step of heating, after the cooling step, the pasta noodle strands for 10 to 120 minutes under an environment maintained at a temperature lower by at least 15°C than the temperature in the drying step and within a range of 50 to 80°C, and humidity of 60 to 90%.

[Description of Embodiments]

55 **[0009]** An object of the present invention is to provide a method for manufacturing dried pasta having no or very little cracking.

**[0010]** The present inventor conducted intensive research in order to achieve the aforementioned object. As a result, they found that dried pasta having no or very little cracking can be obtained by performing a drying step of drying pasta noodle strands at high temperature and high humidity, and successively performing a heating step of heating the pasta

noodle strands at temperature lower by at least 15°C than the temperature in the drying step, and subsequently performing a cooling step of cooling the pasta noodle strands, or performing the cooling step subsequent to the drying step, and then performing the heating step, thereby completing the present invention.

**[0011]** The present invention can provide dried pasta having no or very little cracking, which is free from the risk of damage such as breakage or chipping of pasta, and moreover, is visually beautiful.

**[0012]** In the method for manufacturing dried pasta of the present invention, the pasta noodle strands may be one which is manufactured by a common method using durum wheat as a raw material. No particular limitation is imposed on the durum wheat, and publicly known durum wheat can be used.

**[0013]** No particular limitation is imposed on the pasta noodle strands as long as they are a long pasta, and examples thereof may include all sorts of long pastas such as spaghetti, spaghettini, fedelini, capellini, tagliatelle, fettucine, and linguine. In regard to a diameter before drying, pasta which is 1 mm to 2.5 mm thick is preferable, and pasta which is approximately 1.4 to 1.8 mm thick in diameter is more preferable. It is to be noted that in the present specification, the diameter of noodle strands or thickness of noodle strands refers to the maximum length in the width direction of the cross-sectional surface of the noodle strands.

**[0014]** The aforementioned pasta noodle strands can be manufactured by a commonly performed extrusion method. For example, the aforementioned pasta noodle strands can be manufactured by the following steps. To durum wheat, water, preferably warm water of 30 to 40°C is added in an amount of 23 to 30% by weight relative to the durum wheat, followed by mixing. Upon completion of the mixing, the resulting dough is sent to a vacuum mixer, where it is deaerated and compressed while kneading under a reduced pressure of approximately 600 ± 100 mmHg. Subsequently, the dough is sent to a die under a high pressure of around 80 kg/cm<sup>2</sup>. The dough sent to the die is extruded from holes in the die and molded into pasta of desired shape.

**[0015]** The pasta noodle strands manufactured by extrusion molding by the steps shown above are then subjected to the drying step according to the method of the present invention. Before being subjected to the drying step, the diameter of the pasta noodle strands may be 1 mm to 2.5 mm, preferably approximately 1.4 to 1.8 mm, and the percentage of water content thereof may be approximately 20 to 35% by mass, preferably approximately 26 to 30% by mass.

**[0016]** It is to be noted that in the present specification, the percentage of water content of the pasta noodle strands refers to a value obtained by measuring the percentage of water content of the whole part of pasta in accordance with, for example, an oven-drying method (a method involving heating to 130°C and measuring the change in weight).

**[0017]** According to one aspect of the method for manufacturing dried pasta of the present invention, first of all, the aforementioned pasta noodle strands are subjected to the drying step. In the drying step, the pasta noodle strands are dried under an environment maintained at a temperature of 75 to 95°C, preferably 80 to 90°C. At this time, humidity (relative humidity according to JIS Z8806, the same will apply hereinbelow in the present specification) may be 60 to 90%, preferably 70 to 80%. In this drying step, the pasta noodle strands are dried to reach the percentage of water content of 14% by mass or less, preferably 12% by mass or less.

**[0018]** Subsequently, the resulting pasta noodle strands are transferred to an environment maintained at a temperature lower by at least 15°C than the temperature in the aforementioned drying step and within a range of 50 to 80°C, and then subjected to the heating step under the aforementioned environment. Preferably, the pasta noodle strands are transferred to an environment maintained at a temperature lower by at least 20°C than the temperature in the aforementioned drying step and within a range of 50 to 75°C, and then subjected to the heating step under the aforementioned environment.

**[0019]** The temperature change occurring during transfer from the aforementioned drying step to this heating step is preferably 1°C/minute.

**[0020]** The humidity in the heating step may be 60 to 90%, preferably 70 to 80%, and the heating time may be 10 to 120 minutes, preferably 30 to 90 minutes.

**[0021]** After the heating step, the aforementioned pasta noodle strands are transferred to an environment maintained at a temperature of 20 to 40°C, preferably 20 to 35°C, and subsequently subjected to the cooling step under this environment.

**[0022]** The temperature change occurring during transfer from the aforementioned heating step to this cooling step is preferably 1°C/minute.

**[0023]** The humidity in the cooling step may be 40 to 80%, preferably 60 to 70%, and the cooling time may be 10 to 60 minutes, preferably 15 to 30 minutes.

**[0024]** According to another aspect of the method for manufacturing dried pasta of the present invention, first of all, the aforementioned pasta noodle strands are subjected to the drying step under the aforementioned conditions, and subsequently the resulting pasta noodle strands are subjected to the cooling step under the aforementioned conditions, and then to the heating step under the aforementioned conditions. The temperature change occurring during transfer from the cooling step to the heating step is preferably 1°C/minute.

**[0025]** Further, it is preferable to subject the pasta noodle strands having been subjected to the above heating step to the cooling step once again. The conditions applied to the second round of the cooling step are similar to those applied

to the aforementioned first round of the cooling step.

**[0026]** The percentage of water content of the dried pasta manufactured by the aforementioned method for manufacturing dried pasta of the present invention may be approximately 14 to 10% by mass, preferably approximately 12 to 11% by mass.

**[0027]** In the method for manufacturing dried pasta of the present invention, the aforementioned drying, heating, and cooling steps can each be performed using an instrument which has been conventionally used for drying or cooling of pasta, for example an instrument capable of maintaining the temperature and humidity at a constant level such as a constant temperature dryer.

**[0028]** In the method for manufacturing dried pasta of the present invention, other steps can be appropriately performed as needed before the drying step or after the cooling step or heating step.

**[0029]** The dried pasta obtained by the manufacturing method of the present invention has no or very little cracking, and thus is free from the risk of damage such as breakage or chipping of pasta, and moreover, has beautiful appearance. Accordingly, the present invention can provide high quality dried pasta with high commercial value.

#### [Examples]

**[0030]** Hereinbelow, the present invention will be described further in detail with reference to Examples. However, the present invention is not limited only to these Examples.

**[0031]** It is to be noted that hereinbelow the conditions of temperature and humidity will indicate average temperature and humidity in each step, and a temperature fluctuation of approximately  $\pm 2^{\circ}\text{C}$  and a humidity fluctuation of approximately  $\pm 1\%$  are acceptable.

#### Reference Example 1 Manufacture of pasta noodle strands

**[0032]** To 5 kg of durum wheat, 1.4 kg of warm water of  $30^{\circ}\text{C}$  was added, followed by mixing. The resulting dough was sent to a vacuum mixer, where it was compressed under a reduced pressure of 600 mmHg while kneading. Subsequently, the dough was extruded from a die at a pressure of 80 kg/cm<sup>2</sup>, whereby pasta noodle strands having a diameter of 1.6 mm and a length of 250 mm were manufactured (percentage of water content, 28% by mass).

#### Example 1

**[0033]** Four kilograms of the pasta noodle strands manufactured in Reference Example 1 were dried under the conditions of  $80^{\circ}\text{C}$  at a humidity of 70% to obtain pasta with the percentage of water content of 12% by mass. Subsequently, the resulting pasta was heated under the conditions of  $60^{\circ}\text{C}$  at a humidity of 70% for 60 minutes, and then cooled under the conditions of  $30^{\circ}\text{C}$  at a humidity of 70% for 30 minutes to obtain dried pasta (percentage of water content, 12% by mass).

#### Example 2

**[0034]** Four kilograms of the pasta noodle strands manufactured in Reference Example 1 were dried under the conditions of  $80^{\circ}\text{C}$  at a humidity of 70% to obtain pasta with the percentage of water content of 12% by mass. Subsequently, the resulting pasta was cooled under the conditions of  $30^{\circ}\text{C}$  at a humidity of 70% for 30 minutes, and then heated under the conditions of  $60^{\circ}\text{C}$  at a humidity of 70% for 60 minutes to obtain dried pasta (percentage of water content, 12% by mass).

#### Comparative Example 1

**[0035]** Four kilograms of the pasta noodle strands manufactured in Reference Example 1 were dried under the conditions of  $80^{\circ}\text{C}$  at a humidity of 70% to obtain pasta with the percentage of water content of 12% by mass. Subsequently, the pasta was cooled under the conditions of  $30^{\circ}\text{C}$  at a humidity of 70% for 30 minutes to obtain dried pasta (percentage of water content, 12% by mass).

#### Comparative Example 2

**[0036]** Four kilograms of the pasta noodle strands manufactured in Reference Example 1 were dried under the conditions of  $80^{\circ}\text{C}$  at a humidity of 70% to obtain pasta with the percentage of water content of 12% by mass. Subsequently, the resulting pasta was heated under the conditions of  $70^{\circ}\text{C}$  at a humidity of 70% for 60 minutes, and then cooled under the conditions of  $30^{\circ}\text{C}$  at a humidity of 70% for 30 minutes to obtain dried pasta (percentage of water content, 12% by

mass).

#### Test Example 1

- 5 **[0037]** Cracking in the dried pastas of Examples 1 to 2 and Comparative Examples 1 to 2 was visually evaluated and assessment was made based on the following assessment criteria. The results are shown in Table 1.

#### Assessment criteria

#### 10 **[0038]**

A: In 1000 pasta noodle strands, white turbidity (cracking) of 1 mm or longer was not confirmed at all (percentage of cracking, 0%).

- 15 B: In 1000 pasta noodle strands, white turbidity (cracking) of 1 mm or longer was confirmed at a very small ratio (percentage of cracking, less than 0.5%). C: In 1000 pasta noodle strands, a large quantity of white turbidity (cracking) of 1 mm or longer was confirmed (percentage of cracking, 0.5% or more).

20 [Table 1]

| Sample     | Example 1                                                                                                                                                                                                                                                     | Example 2                                                                                                                                                                                                                                                     | Comparative Example 1                                                                                                                                                                                | Comparative Example 2                                                                                                                                                                                                                                         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step       | Drying step<br>Temperature 80°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass)<br>↓<br>Heating step<br>Temperature 60°C<br>Humidity 70%<br>↓<br>Cooling step<br>Temperature 30°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass) | Drying step<br>Temperature 80°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass)<br>↓<br>Cooling step<br>Temperature 30°C<br>Humidity 70%<br>↓<br>Heating step<br>Temperature 60°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass) | Drying step<br>Temperature 80°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass)<br>↓<br>Cooling step<br>Temperature 30°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass) | Drying step<br>Temperature 80°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass)<br>↓<br>Heating step<br>Temperature 70°C<br>Humidity 70%<br>↓<br>Cooling step<br>Temperature 30°C<br>Humidity 70%<br>(Percentage of water content, 12% by mass) |
| Assessment | A                                                                                                                                                                                                                                                             | A                                                                                                                                                                                                                                                             | C                                                                                                                                                                                                    | C                                                                                                                                                                                                                                                             |

#### Test Example 2 Effects of temperature conditions in the heating step

- 45 **[0039]** From the pasta noodle strands manufactured in Reference Example 1, dried pasta was manufactured by similar steps to those in Example 1 excluding under the temperature and humidity conditions shown in the following Table 2. Cracking in the resulting dried pasta was assessed based on similar assessment criteria to those in Test Example 1. The results are shown in Table 2.

50

[Table 2]

| Sample                          | Sample 1 | Sample 2 | Sample 3 | Sample 4 | Sample 5 | Sample 6 | Sample 7 | Sample 8 | Sample 9 |
|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Drying step<br>Temperature (°C) | 80       | 80       | 80       | 80       | 80       | 80       | 95       | 80       | 80       |

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(continued)

|    | Sample                        | Sample 1  | Sample 2  | Sample 3  | Sample 4  | Sample 5  | Sample 6  | Sample 7 | Sample 8 | Sample 9 |
|----|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|
| 5  | Humidity (%)<br>↓             | 70        | 75        | 80        | 70        | 75        | 80        | 80       | 80       | 80       |
|    | Heating step Temperature (°C) | -         | -         | -         | 50        | 60        | 65        | 80       | 70       | 75       |
| 10 | Humidity (%)<br>↓             | -         | -         | -         | 70        | 70        | 70        | 70       | 70       | 70       |
|    | Cooling step Temperature (°C) | 30        | 30        | 30        | 30        | 30        | 30        | 30       | 30       | 30       |
| 15 | Humidity (%)<br>↓             | 70        | 70        | 70        | 70        | 70        | 70        | 70       | 70       | 70       |
|    | Heating step Temperature (°C) | -         | -         | -         | -         | -         | -         | -        | -        | -        |
| 20 | Humidity (%)<br>↓             | -         | -         | -         | -         | -         | -         | -        | -        | -        |
|    | Cooling step Temperature (°C) | -         | -         | -         | -         | -         | -         | -        | -        | -        |
| 25 | Humidity (%)<br>↓             | -         | -         | -         | -         | -         | -         | -        | -        | -        |
|    | Assessment                    | C         | C         | C         | B         | A         | B         | B        | C        | C        |
| 30 | Sample                        | Sample 10 | Sample 11 | Sample 12 | Sample 13 | Sample 14 | Sample 15 |          |          |          |
|    | Drying step Temperature (°C)  | 80        | 80        | 80        | 95        | 80        | 80        |          |          |          |
| 35 | Humidity (%)<br>↓             | 70        | 75        | 80        | 80        | 80        | 75        |          |          |          |
|    | Heating step Temperature (°C) | -         | -         | -         | -         | -         | -         |          |          |          |
| 40 | Humidity (%)<br>↓             | -         | -         | -         | -         | -         | -         |          |          |          |
|    | Cooling step Temperature (°C) | 30        | 30        | 30        | 30        | 30        | 30        |          |          |          |
| 45 | Humidity (%)<br>↓             | 70        | 70        | 70        | 70        | 70        | 70        |          |          |          |
|    | Heating step Temperature (°C) | 50        | 60        | 65        | 80        | 70        | 75        |          |          |          |
| 50 | Humidity (%)<br>↓             | 70        | 70        | 70        | 70        | 70        | 70        |          |          |          |
| 55 | Cooling step Temperature (°C) | 30        | 30        | 30        | 30        | 30        | 30        |          |          |          |

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(continued)

|              |           |           |           |           |           |           |  |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| Sample       | Sample 10 | Sample 11 | Sample 12 | Sample 13 | Sample 14 | Sample 15 |  |
| Humidity (%) | 70        | 70        | 70        | 70        | 70        | 70        |  |
| Assessment   | B         | A         | B         | B         | C         | C         |  |

Test Example 3 Effects of heating time in the heating step

**[0040]** From the pasta noodle strands manufactured in Reference Example 1, dried pasta was manufactured by similar steps to those in Example 1 excluding under the conditions shown in the following Table 3. Cracking in the resulting dried pasta was assessed based on similar assessment criteria to those in Test Example 1. The results are shown in Table 3.

[Table 3]

| Sample             | Sample 14 | Sample 15 | Sample 16 | Sample 17 | Sample 18 | Sample 19 | Sample 20 | Sample 21 |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Drying step        |           |           |           |           |           |           |           |           |
| Temperature (°C)   | 80        | 80        | 80        | 80        | 80        | 80        | 80        | 80        |
| Humidity (%)       | 70        | 75        | 80        | 80        | 70        | 75        | 80        | 80        |
| ↓                  |           |           |           |           |           |           |           |           |
| Heating step       |           |           |           |           |           |           |           |           |
| Temperature (°C)   | 60        | 60        | 60        | 60        | -         | -         | -         | -         |
| Humidity (%)       | 70        | 70        | 70        | 70        | -         | -         | -         | -         |
| Heating time (min) | 10        | 30        | 60        | 120       | -         | -         | -         | -         |
| ↓                  |           |           |           |           |           |           |           |           |
| Cooling step       |           |           |           |           |           |           |           |           |
| Temperature (°C)   | 30        | 30        | 30        | 30        | 30        | 30        | 30        | 30        |
| Humidity (%)       | 70        | 70        | 70        | 70        | 70        | 70        | 70        | 70        |
| ↓                  |           |           |           |           |           |           |           |           |
| Heating step       |           |           |           |           |           |           |           |           |
| Temperature (°C)   | -         | -         | -         | -         | 60        | 60        | 60        | 60        |
| Humidity (%)       | -         | -         | -         | -         | 70        | 70        | 70        | 70        |
| Heating time (min) | -         | -         | -         | -         | 10        | 30        | 60        | 120       |
| ↓                  |           |           |           |           |           |           |           |           |
| Cooling step       |           |           |           |           |           |           |           |           |
| Temperature (°C)   | -         | -         | -         | -         | 30        | 30        | 30        | 30        |
| Humidity (%)       | -         | -         | -         | -         | 70        | 70        | 70        | 70        |
| Assessment         | B         | B         | A         | A         | B         | B         | A         | A         |

### Claims

1. A method for manufacturing dried pasta, comprising;
  - a drying step of drying pasta noodle strands to reach a percentage of water content of 14% or less under an environment maintained at a temperature of 75 to 95°C and humidity of 60 to 90%;

a heating step of heating, after the drying step, the pasta noodle strands for 10 to 120 minutes under an environment maintained at a temperature lower by at least 15°C than the temperature in the drying step and within a range of 50 to 80°C, and humidity of 60 to 90%; and

a cooling step of cooling, after the heating step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%.

2. A method for manufacturing dried pasta, comprising;
  - a drying step of drying pasta noodle strands to reach a percentage of water content of 14% or less under an environment maintained at a temperature of 75 to 95°C and humidity of 60 to 90%;
  - a cooling step of cooling, after the drying step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%; and
  - a heating step of heating, after the cooling step, the pasta noodle strands for 10 to 120 minutes under an environment maintained at a temperature lower by at least 15°C than the temperature in the drying step and within a range of 50 to 80°C, and humidity of 60 to 90%.
3. The method according to claim 2, further comprising the cooling step of cooling, after the heating step, the pasta noodle strands for 10 to 60 minutes under an environment maintained at a temperature of 20 to 40°C and humidity of 40 to 80%.
4. The method according to any one of claims 1 to 3, wherein a diameter of the pasta noodle strands before being subjected to the drying step is 1 mm to 2.5 mm.
5. The method according to any one of claims 1 to 4, wherein the percentage of water content of the pasta noodle strands before being subjected to the drying step is 20 to 35% by mass.
6. The method according to any one of claims 1 to 5, wherein the pasta noodle strands to be subjected to the drying step is manufactured by an extrusion method.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/056619

| A. CLASSIFICATION OF SUBJECT MATTER<br>A23L1/16(2006.01) i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                 |                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                 |                                                                                |
| B. FIELDS SEARCHED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                 |                                                                                |
| Minimum documentation searched (classification system followed by classification symbols)<br>A23L1/16-1/162                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                 |                                                                                |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched<br>Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2012<br>Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                 |                                                                                |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>CA/BIOSIS/MEDLINE/WPIDS (STN), JSTPlus/JMEDPlus/JST7580 (JDreamII),<br>G-Search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                 |                                                                                |
| C. DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                 |                                                                                |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document, with indication, where appropriate, of the relevant passages                                              | Relevant to claim No.                                                          |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 56-078571 A (Ranks Hovis McDougall PLC.),<br>27 June 1981 (27.06.1981),<br>& GB 2063643 A & DE 3042665 A1<br>& FR 8024815 A1 | 1-6                                                                            |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 58-216655 A (House Foods Industrial Co.,<br>Ltd.),<br>16 December 1983 (16.12.1983),<br>(Family: none)                       | 1-6                                                                            |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | JP 59-95854 A (House Foods Industrial Co.,<br>Ltd.),<br>02 June 1984 (02.06.1984),<br>(Family: none)                            | 1-6                                                                            |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                 |                                                                                |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |                                                                                                                                 |                                                                                |
| Date of the actual completion of the international search<br>11 June, 2012 (11.06.12)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                 | Date of mailing of the international search report<br>19 June, 2012 (19.06.12) |
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| Facsimile No.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                 | Telephone No.                                                                  |

## INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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**REFERENCES CITED IN THE DESCRIPTION**

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